U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-287 858

Lake Eloise
Polk County, Florida

(U.S.) National Eutrophication Survey, Corvallis, OR

Prepared for

Corvallis Environmental Research Lab, OR

Dec 77

PB 287858

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON

and

ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

O. 699-440

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. PB287858
4. TITLE AND SUBTITLE Report on Lake Eloise, Polk County, Florida		5. REPORT DATE Prepared December 1977 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Anonymous (National Eutrophication Survey Staff)		8. PERFORMING ORGANIZATION REPORT NO. Working Paper # 250
9. PERFORMING ORGANIZATION NAME AND ADDRESS National Eutrophication Survey U.S. Environmental Protection Agency 200 S. W. 35th St. Corvallis, Oregon 97330		10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS Office of Research and Development U.S. Environmental Protection Agency 401 M Street, S. W. Washington, DC 20460		13. TYPE OF REPORT AND PERIOD COVERED Final - March '73 - Feb. '74 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES
Prepared in cooperation with the U.S. Environmental Protection Agency, National Environmental Research Center, Las Vegas, Nevada 89114

16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
eutrophication lakes nutrients phosphorus nitrogen loading		48G

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
Release unlimited		35
	20. SECURITY CLASS (This page)	22. PRICE A03-A01

EPA Form 2220-1 (9-73)

REPORT
ON
LAKE ELOISE
POLK COUNTY
FLORIDA
EPA REGION IV
WORKING PAPER No. 250

WITH THE COOPERATION OF THE
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
AND THE
FLORIDA NATIONAL GUARD
DECEMBER, 1977

CONTENTS

	Page
Foreword	ii
List of Florida Lakes	iv
Lake and Drainage Area Map	v
Sections	
I. Introduction	1
II. Conclusions	1
III. Lake and Drainage Basin Characteristics	3
IV. Water Quality Summary	4
V. Literature Reviewed	8
VI. Appendices	9

FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Florida Department of Environmental Regulation for professional involvement and to the Florida National Guard for conducting the tributary sampling phase of the Survey.

Joseph W. Landers, Jr., Secretary of the Department of Environmental Regulation; John A Redmond, former Director of the Division of Planning, Technical Assistance, and Grants; and Dr. Tim S. Stuart, Chief of the Bureau of Water Quality, provided invaluable lake documentation and counsel during the survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

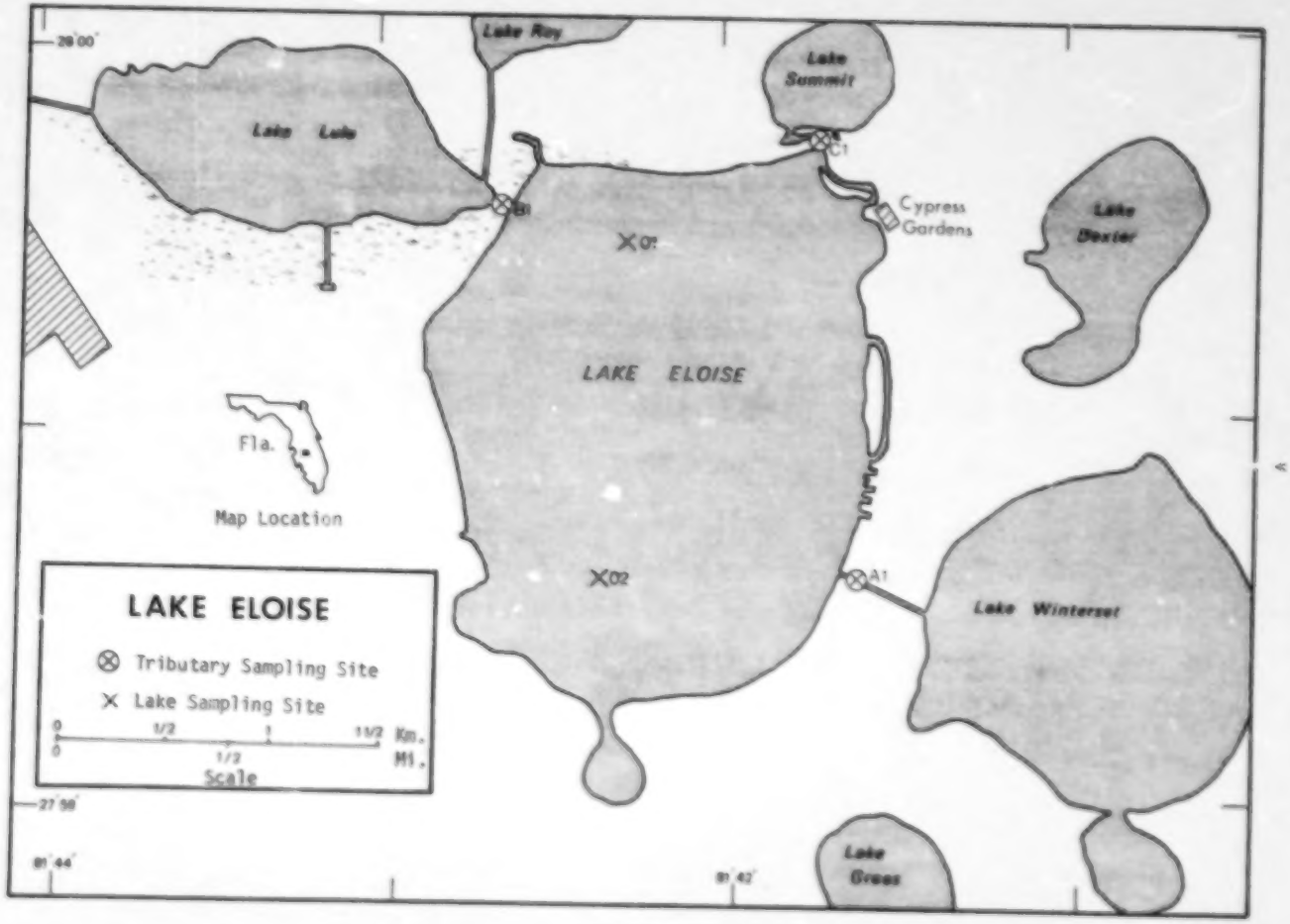
Major General Henry W. McMillan (Retired), then the Adjutant General of Florida, and Project Officer Colonel Hugo F. Windham, who directed the volunteer efforts of the Florida National Guard, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF FLORIDA

LAKE NAME	COUNTY
Alligator	Columbia
Apopka	Lake, Orange
Banana	Polk
Crescent	Flagler, Putnam
Doctors	Clay
Dora	Lake
East Tohopekaliga	Osceola
Effie	Polk
Eloise	Polk
George	Putnam, Volusia
Gibson	Polk
Glenada	Highlands
Griffin	Lake
Haines	Polk
Hancock	Polk
Horseshoe	Seminole
Howell	Orange, Seminole
Istokpoga	Highlands
Jessie	Polk
Jessup	Seminole
Kissimmee	Osceola
Lawne	Orange
Lulu	Polk
Marion	Polk
Minnehaha	Orange
Minneola	Lake
Monroe	Seminole, Volusia
Munson	Leon
Okeechobee	Glades, Hendry, Martin, Okeechobee, Palm Beach
Poinsett	Brevard, Orange, Osceola
Reedy	Polk
Seminole	Jackson, FL; Decatur, Seminole, GA
Seminole	Pinellas
South	Brevard
Talquin	Gadsden, Leon
Tarpon	Pinellas
Thonotosassa	Hillsborough
Tohopekaliga	Osceola
Trout	Lake
Weohyakapka	Polk
Yale	Lake


28°00'
Lake Ray
Lake Summit
Lake Lulu
C1
B1
Cypress Gardens
Lake Dexter
X01
LAKE ELOISE
Fla.
Map Location
X02
A1
Lake Winterset
LAKE ELOISE
⊗ Tributary Sampling Site
× Lake Sampling Site
0 1/2 1 1½ Km.
0 1/2 Mi.
Scale
27°58'
81°44'
81°42'
Lake Grass

LAKE ELOISE

STORET NO. 1252

I. INTRODUCTION

Lake Eloise is one of the Winter Haven chain of lakes. The hydrology of this chain is complex, and personnel of the U.S. Geological Survey question whether realistic analyses of nutrient loadings to the lakes can be made; i.e., depending on the operation of control gates, wind direction and velocity, and other factors, flows in the connecting canals may have reversed from one sampling time to the next (Anderson, 1974). For example, during the Survey sampling year, the less-than-normal precipitation probably resulted in a net flow from Lake Lulu to Lake Eloise rather than the reverse (Dye, 1976).

It will be noted in Appendix C that daily flows could not be provided by the U.S. Geological Survey, and it cannot be determined whether net flows were to or from Lake Eloise at any of the sampling stations or times. Therefore, nutrient loads to the lake cannot be calculated; however, the canal sampling data are included in Appendix E for the record.

II. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Lake Eloise is eutrophic. It ranked thirty-first in overall trophic quality when the 41 Florida lakes sampled in 1973 were compared using a combination of six lake parameters*. Thirty-eight of the lakes had less

* See Appendix A.

median total phosphorus, 32 had less median dissolved phosphorus, 20 had less median inorganic nitrogen, 29 had less mean chlorophyll *a*, and 15 had greater mean Secchi disc transparency. Marked depression of dissolved oxygen with depth occurred at station 1 in March.

Survey limnologist noted macrophytes in about 90% of the shoreline shallows near both sampling stations.

B. Rate-Limiting Nutrient:

The results of the algal assay indicate that Lake Eloise primary production was limited by nitrogen at the time the sample was collected. Inorganic nitrogen to orthophosphorus ratios in the lake water confirm the algal assay conclusions; i.e., N/P ratios were less than 1/1 on all sampling occasions.

III. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Morphometry††:

1. Surface area: 4.69 kilometers^2.
2. Mean depth: 3.0 meters.
3. Maximum depth: 5.2 meters.
4. Volume: 14.070 x 10^6 m^3.
5. Mean hydraulic retention time: 8.9 years.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)**
Unnamed Canal A-1	5.7	0.03
Unnamed Canal C-1	0.8	0.00
Minor tributaries & immediate drainage -	3.4	0.02
Totals	9.9	0.05

2. Outlet -

Unnamed Canal B-1	14.6***	0.05

C. Precipitation****:

1. Year of sampling: 120.3 centimeters.
2. Mean annual: 136.7 centimeters.

---

† Table of metric conversions--Appendix B.
†† Anonymous, 1971; depths estimated from soundings reported in Appendix D.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Based on net effects of factors affecting flows in connecting canals during the period of October, 1960, through September, 1968 (Anderson, 1974).
*** Includes area of lake.
**** See Working Paper No. 175.

IV. WATER QUALITY SUMMARY

Lake Eloise was sampled three times during 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 4.6 meters at station 1 and 3.0 meters at station 2.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR LAKE ELOISE
STORET CODE 1252

PARAMETER	1ST SAMPLING (3/ 8/73) 2 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (9/ 6/73) 2 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (11/ 6/73) 2 SITES RANGE	MEAN	MEDIAN
TEMP (C)	17.3 - 23.5	20.7	21.3	28.3 - 29.0	28.6	28.6	23.0 - 23.7	23.5	23.6
DISS OXY (MG/L)	2.8 - 11.9	8.4	9.2	7.8 - 9.8	8.8	8.8	4.8 - 8.6	7.5	8.4
CNDCTVY (MCROMO)	340. - 355.	344.	345.	365. - 370.	368.	368.	333. - 335.	335.	335.
PH (STAND UNITS)	9.0 - 9.9	9.5	9.7	8.7 - 9.3	9.1	9.1	8.8 - 9.3	9.1	9.2
TOT ALK (MG/L)	77. - 84.	81.	82.	78. - 85.	82.	82.	78. - 83.	81.	82.
TOT P (MG/L)	0.460 - 0.655	0.535	0.510	0.390 - 0.411	0.398	0.396	0.477 - 0.610	0.520	0.502
ORTHO P (MG/L)	0.360 - 0.416	0.383	0.374	0.214 - 0.270	0.245	0.248	0.311 - 0.348	0.326	0.326
NO2+NO3 (MG/L)	0.070 - 0.100	0.091	0.100	0.090 - 0.100	0.097	0.100	0.070 - 0.090	0.078	0.080
AMMONIA (MG/L)	0.070 - 0.100	0.081	0.080	0.060 - 0.090	0.077	0.080	0.070 - 0.240	0.110	0.080
KJEL N (MG/L)	1.600 - 2.200	1.857	1.700	2.400 - 2.700	2.525	2.500	2.400 - 2.800	2.560	2.500
INORG N (MG/L)	0.140 - 0.200	0.173	0.180	0.160 - 0.190	0.175	0.175	0.140 - 0.330	0.188	0.160
TOTAL N (MG/L)	1.670 - 2.300	1.949	1.800	2.500 - 2.800	2.622	2.595	2.480 - 2.890	2.638	2.570
CHLRPYL A (UG/L)	53.2 - 54.2	53.7	53.7	96.3 - 109.2	102.7	102.7	50.3 - 58.2	54.2	54.2
SECCHI (METERS)	0.9 - 0.9	0.9	0.9	0.8 - 0.9	0.9	0.9	0.9 - 0.9	0.9	0.9

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
03/08/73	1. Raphidiopsis sp.	22,523
	2. Lyngbya sp.	9,910
	3. Scenedesmus sp.	6,396
	4. Microcystis sp.	4,775
	5. Dictyosphaerium sp.	2,072
	Other genera	9,729
	Total	55,405
09/06/73	1. Lyngbya sp.	20,612
	2. Chroococcus sp.	6,634
	3. Dactylococcopsis sp.	6,502
	4. Raphidiopsis sp.	5,647
	5. Scenedesmus sp.	3,764
	Other genera	34,906
	Total	78,065
11/06/73	1. Dactylococcopsis sp.	5,784
	2. Oscillatoria sp.	4,423
	3. Chroococcus sp.	4,083
	4. Tetraedron sp.	3,062
	5. Centric diatoms	2,722
	Other genera	28,917
	Total	48,991

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
03/08/73	1	54.2
	2	53.2
09/06/73	1	109.2
	2	96.3
11/06/73	1	50.3
	2	58.2

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.042	0.192	10.6
0.050 P	0.092	0.192	9.9
0.050 P + 1.0 N	0.092	1.192	27.6
1.0 N	0.042	1.192	26.5

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Lake Eloise was high at the time the assay sample was collected. The lack of significant change in yield with the addition of orthophosphorus and marked increase in yield when nitrogen was added indicate the lake was nitrogen limited when sampled (03/08/73).

Nitrogen limitation is also indicated by the lake data; i.e., the mean inorganic nitrogen to orthophosphorus ratios were less than 1 to 1 at all sampling stations and times.

V. LITERATURE REVIEWED

Anderson, Warren, 1974. Personal communication (hydrology of Winter Haven chain of lakes) U.S. Geol. Surv., Winter Park.

Anonymous, 1971. Water quality investigations, 1970-71 annual progress report. Dingell-Johnson Proj. No. F-21-5, FL Game & Freshwater Fish Comm., Tallahassee.

Dye, Craig W., 1976. Personal communication (review of preliminary report. FL Dept. Env. Reg., Tallahassee.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	SEC- MEAN SEC	MEAN CHLORA	IS- MIN DO	MEDIAN DISS ORTHO P
1201	ALLIGATOR LAKE	0.620	0.260	474.000	87.733	13.100	0.346
1202	LAKE APOPKA	0.182	0.230	444.176	40.611	8.200	0.019
1203	LAKE BANANA	0.660	0.260	482.667	208.600	3.600	0.293
1206	LAKE CRESCENT	0.065	0.130	473.884	10.211	10.200	0.033
1207	DOCTORS LAKE	0.084	0.120	465.555	27.100	10.600	0.028
1208	LAKE DORA	0.102	0.240	482.889	54.978	7.400	0.022
1209	LAKE EFFIE	1.480	0.410	489.000	261.433	15.000	0.950
1210	LAKE GEORGE	0.129	0.165	469.388	35.000	11.000	0.063
1211	LAKE GIDSON	0.167	0.115	470.000	19.675	10.200	0.069
1212	GLENADA LAKE	0.134	0.165	454.167	27.667	14.700	0.072
1214	LAKE GRIFFIN	0.119	0.260	481.333	66.855	6.600	0.038
1215	LAKE HAINES	0.063	0.115	462.667	20.567	10.600	0.014
1217	LAKE HANCOCK	0.772	0.195	483.500	97.900	5.600	0.150
1219	LAKE HORSESHOE	0.034	0.130	459.000	12.067	11.500	0.023
1220	LAKE HOWELL	1.260	0.295	464.000	54.117	9.000	1.175
1221	LAKE ISTOKPOGA	0.039	0.120	464.222	6.594	8.600	0.010
1223	LAKE JESSUP	0.492	0.290	487.000	70.550	7.000	0.248
1224	LAKE KISSIMMEE	0.034	0.145	463.667	24.142	8.800	0.007
1227	LAKE LULU	1.490	1.065	483.000	276.566	14.300	1.030
1228	LAKE MARION	0.044	0.260	468.833	29.967	7.600	0.016
1229	LAKE MINNEHAHA	0.038	0.080	435.000	8.733	7.700	0.012
1230	LAKE MINNEOLA	0.018	0.070	406.333	3.333	7.400	0.009
1231	LAKE MONROE	0.189	0.300	474.555	14.225	10.600	0.128
1232	LAKE OKEECHOBEE	0.063	0.145	472.346	14.524	9.800	0.010
1234	LAKE POINSETT	0.065	0.150	469.000	6.500	10.600	0.051
1236	LAKE PEEDY	0.031	0.330	468.500	14.837	10.600	0.008
1238	LAKE SOUTH	0.074	0.130	464.000	23.167	9.000	0.028
1239	LAKE TALQUIN	0.085	0.290	462.167	9.483	14.400	0.031

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	SSD-MEAN SEC	MEAN CHLORA	19-MIN DO	MEDIAN DISS ORTHO P
1240	LAKE THONOTOSASSA	0.695	0.095	460.107	37.700	10.200	0.565
1241	LAKE TOHOPEKALIGA	0.246	0.280	472.917	38.633	10.500	0.192
1242	TROUT LAKE	1.110	0.650	472.000	76.967	12.900	0.470
1243	LAKE HEONYAKAPKA	0.047	0.080	458.667	7.767	8.200	0.011
1246	LAKE YALE	0.027	0.160	441.000	25.367	7.600	0.014
1247	LAKE MUNSON	1.475	0.425	486.667	149.317	12.200	0.652
1248	LAKE SEMINOLE	0.234	0.175	473.833	102.000	8.600	0.026
1249	LAKE LAWNE	2.560	1.350	494.667	84.900	10.400	0.117
1250	LAKE TARPON	0.041	0.070	485.889	6.867	9.000	0.027
1252	LAKE ELOISE	0.486	0.170	469.333	70.233	12.200	0.339
1256	LAKE JESSIE	0.051	0.090	459.667	26.300	10.800	0.011
1261	EAST LAKE TOHOPEKALIGA	0.042	0.070	446.833	5.167	9.400	0.007
1264	PAYNE'S PRAIRIE LAKE 140	1.260	0.140	476.000	88.200	7.400	1.210

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NU
1201	ALLIGATOR LAKE	25 (10)	20 (10)	30 (12)	18 (7)	10 (4)	18 (7)	140
1202	LAKE APOPKA	50 (20)	38 (15)	10 (4)	38 (15)	74 (29)	70 (28)	280
1203	LAKE BANANA	23 (9)	29 (10)	20 (8)	5 (2)	100 (40)	23 (9)	200
1206	LAKE CRESCENT	65 (26)	70 (27)	33 (13)	80 (32)	48 (18)	50 (20)	346
1207	DOCTORS LAKE	60 (24)	76 (30)	60 (24)	55 (22)	34 (12)	56 (22)	341
1208	LAKE DORA	53 (21)	35 (14)	18 (7)	33 (13)	90 (35)	68 (27)	297
1209	LAKE EFFIE	5 (2)	15 (6)	3 (1)	3 (1)	0 (0)	10 (4)	31
1210	LAKE GEORGE	45 (18)	54 (21)	48 (19)	43 (17)	23 (9)	43 (17)	256
1211	LAKE GIBSON	40 (16)	81 (32)	45 (18)	70 (28)	48 (18)	40 (16)	324
1212	GLENADA LAKE	43 (17)	54 (21)	85 (34)	53 (21)	3 (1)	38 (15)	276
1214	LAKE GRIFFIN	48 (19)	29 (10)	23 (9)	30 (12)	95 (38)	48 (19)	273
1215	LAKE HAINES	70 (28)	81 (32)	75 (30)	58 (23)	34 (12)	78 (31)	396
1217	LAKE HANCOCK	18 (7)	43 (17)	13 (5)	13 (5)	98 (39)	28 (11)	213
1219	LAKE HORSESHOE	93 (37)	70 (27)	80 (32)	78 (31)	20 (8)	65 (26)	486
1220	LAKE HOWELL	11 (4)	23 (9)	69 (27)	35 (14)	60 (23)	3 (1)	201
1221	LAKE ISTOKPOGA	85 (34)	76 (30)	65 (26)	93 (37)	69 (27)	89 (35)	477
1223	LAKE JESSUP	28 (11)	18 (7)	5 (2)	25 (10)	83 (32)	25 (10)	194
1224	LAKE KISSIMMEE	90 (36)	63 (25)	73 (29)	65 (26)	65 (26)	99 (39)	495
1227	LAKE LULU	3 (1)	3 (1)	15 (6)	0 (0)	8 (3)	5 (2)	34
1228	LAKE MARION	78 (31)	29 (10)	53 (21)	50 (20)	83 (32)	73 (29)	366
1229	LAKE MINNEHAHA	88 (35)	91 (36)	95 (38)	85 (34)	78 (31)	80 (32)	517
1230	LAKE MINNEOLA	100 (40)	98 (39)	98 (39)	100 (40)	90 (35)	93 (37)	579
1231	LAKE MONROE	38 (15)	15 (6)	28 (11)	75 (30)	26 (10)	33 (13)	215
1232	LAKE OKEECHOBEE	68 (27)	45 (18)	40 (16)	73 (29)	53 (21)	89 (35)	366
1234	LAKE POINSETT	58 (23)	60 (24)	50 (20)	95 (38)	34 (12)	45 (18)	342
1236	LAKE REEDY	95 (38)	13 (5)	55 (22)	45 (18)	34 (12)	95 (38)	337
1238	LAKE SOUTH	63 (25)	70 (27)	69 (27)	68 (27)	60 (23)	56 (22)	386
1239	LAKE TALQUIN	55 (22)	20 (8)	78 (31)	83 (33)	5 (2)	53 (21)	294

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500= MEAN SEC	MEAN CHLOPA	15= MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1240	LAKE THONOTOSASSA	20 (8)	88 (36)	58 (23)	40 (16)	48 (18)	15 (6)	266
1241	LAKE TOHOPEKALIGA	33 (13)	40 (16)	38 (15)	48 (19)	40 (16)	30 (12)	229
1242	TROUT LAKE	15 (6)	8 (3)	43 (17)	23 (9)	13 (5)	8 (3)	110
1243	LAKE WEOHYAKAPKA	75 (30)	91 (36)	83 (33)	88 (35)	74 (29)	84 (33)	495
1246	LAKE YALE	99 (39)	58 (23)	90 (36)	63 (25)	83 (32)	75 (30)	467
1247	LAKE MUNSON	8 (3)	5 (2)	8 (3)	0 (3)	16 (6)	13 (5)	58
1248	LAKE SEMINOLE	35 (14)	48 (19)	35 (14)	10 (4)	69 (27)	63 (25)	260
1249	LAKE LAWNE	0 (0)	0 (0)	0 (0)	20 (8)	43 (17)	35 (14)	98
1250	LAKE TARPON	83 (33)	96 (38)	100 (40)	90 (36)	60 (23)	60 (24)	491
1252	LAKE ELOISE	30 (12)	50 (20)	63 (25)	28 (11)	16 (6)	20 (8)	207
1258	LAKE JESSIE	73 (29)	88 (35)	88 (35)	60 (24)	26 (10)	84 (33)	419
1261	EAST LAKE TOHOPEKALIGA	80 (32)	98 (38)	93 (37)	98 (39)	55 (22)	99 (39)	523
1264	PAYNE'S PRAIRIE LAKE (VO	11 (4)	65 (26)	25 (10)	15 (6)	90 (35)	0 (0)	206

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1230	LAKE MINNEOLA	579
2	1261	EAST LAKE TOHOPEKALIGA	523
3	1229	LAKE MINNEHAHA	517
4	1243	LAKE WEOHYAKAPKA	495
5	1258	LAKE TARPON	491
6	1221	LAKE ISTOKPOGA	477
7	1246	LAKE YALE	467
8	1224	LAKE KISSIMMEE	455
9	1259	LAKE JESSIE	419
10	1219	LAKE HORSESHOE	406
11	1215	LAKE HAINES	396
12	1238	LAKE SOUTH	386
13	1232	LAKE OKEECHOBEE	368
14	1226	LAKE MARION	366
15	1206	LAKE CRESCENT	346
16	1234	LAKE POINSETT	342
17	1207	DOCTORS LAKE	341
18	1236	LAKE REEDY	337
19	1211	LAKE GIBSON	324
20	1208	LAKE DORA	297
21	1239	LAKE TALQUIN	294
22	1202	LAKE APOPKA	288
23	1212	GLENADA LAKE	276
24	1214	LAKE GRIFFIN	273
25	1248	LAKE THONOTOSASSA	266
26	1240	LAKE SEMINOLE	260
27	1210	LAKE GEORGE	256
28	1241	LAKE TOHOPEKALIGA	229

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	1231	LAKE MONROE	215
30	1217	LAKE HANCOCK	213
31	1252	LAKE ELOISE	207
32	1264	PAYNE'S PRAIRIE LAKE (40	206
33	1229	LAKE HOWELL	201
34	1283	LAKE BANANA	200
35	1223	LAKE JESSUP	184
36	1281	ALLIGATOR LAKE	130
37	1242	TROUT LAKE	110
38	1249	LAKE LANNE	98
39	1267	LAKE MUNSON	58
40	1227	LAKE LULU	34
41	1209	LAKE EFFIE	31

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 - cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR FLORIDA 8/25/75

LAKE CODE 1252 LAKE ELOISE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 14.6

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1252A1	5.7	0.03	0.04	0.02	0.04	0.02	-0.08	0.00	0.01	0.04	0.08	0.06	0.03	0.03
1252B1	14.6	0.06	0.11	0.02	0.10	0.06	-0.28	-0.04	-0.01	0.08	0.22	0.16	0.09	0.05
1252C1	0.8	0.00	0.01	0.01	0.01	0.00	-0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00
1252ZZ	3.3	0.01	0.02	0.03	0.02	0.01	0.00	0.01	0.02	0.03	0.03	0.02	0.01	0.02

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 14.6
SUM OF SUB-DRAINAGE AREAS = 9.8

TOTAL FLOW IN = 0.57
TOTAL FLOW OUT = 0.57

NOTE *** SEE WRITE UP ON WINTER HAVEN CHAIN OF LAKES

NO DAILY FLOW DATA ON FILE

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/08/25

125201
27 59 28.0 081 42 17.0
LAKE ELOISE
12105 FLORIDA

11EPALES 2111202
3 0017 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/08	11 50	0000	23.5	11.9	36	345	9.90	83	0.070	2.100	0.080	0.369
	11 50	0004	23.1	11.9		340	9.90	82	0.080	1.600	0.100	0.374
	11 50	0008	18.5	5.2		340	9.10	84	0.080	2.100	0.090	0.407
	11 50	0013	17.3	2.8		355	9.00	83	0.100	2.200	0.100	0.416
73/09/06	10 55	0000	29.0	8.8	33	370	9.30	80	0.090	2.500	0.100	0.251
	10 55	0015	28.5			365	8.70	78	0.090	2.500	0.090	0.214
73/11/06	13 38	0000	23.7		34	335	9.30	78	0.080	2.400	0.080	0.313
	13 38	0005	23.6	8.4		334	9.20	81	0.080	2.400	0.080	0.311
	13 38	0013	23.0	4.8		333	8.80	83	0.240	2.800	0.090	0.348

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/08	11 50	0000	0.496	54.2
	11 50	0004	0.510	
	11 50	0008	0.595	
	11 50	0013	0.655	
73/09/06	10 55	0000	0.400	109.2
	10 55	0015	0.390	
73/11/06	13 38	0000	0.477	50.3
	13 38	0005	0.477	
	13 38	0013	0.610	

STORET RETRIEVAL DATE 75/08/25

125202
27 58 37.0 081 42 22.0
LAKE ELOISE
12105 FLORIDA

11EPALES
3

2111202
0011 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/08	12 30	0000	22.3		36	340	9.90	78	0.070	1.600	0.070	0.360
	12 30	0004	21.3	10.9		345	9.70	77	0.080	1.700	0.100	0.367
	12 30	0007	19.1	7.6		345	9.30	80	0.090	1.700	0.100	0.388
73/09/06	11 15	0000	28.8	9.8	35	370	9.20	84	0.070	2.700	0.100	0.270
	11 15	0010	28.3	7.8		365	9.10	85	0.060	2.400	0.100	0.245
73/11/06	13 52	0000	23.6		34	335	9.20	83	0.070	2.700	0.070	0.331
	13 52	0001	23.6	8.4		335						
	13 52	0009	23.5	8.6		335	9.20	82	0.080	2.500	0.070	0.326

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/08	12 30	0000	0.465	53.2
	12 30	0004	0.460	
	12 30	0007	0.565	
73/09/06	11 15	0000	0.411	96.3
	11 15	0010	0.393	
73/11/06	13 52	0000	0.535	58.2
	13 52	0009	0.502	

APPENDIX E

TRIBUTARY DATA

STORET RETRIEVAL DATE 75/08/25

12S2A1
27 58 30.0 081 41 30.0
UNNAMED STREAM
12103 7.5 ELOISE
T/LAKE ELOISE
BROG BTWN LKS ELOISE AND WINTERSET
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/18	11 32		0.016	2.200	0.086	0.372	0.560
73/04/15	16 30		0.010K	2.000	0.026	0.160	0.345
73/05/18	14 10		0.022	2.400	0.038	0.378	0.535
73/07/14	12 40		0.026	2.900	0.138	0.310	0.470
73/08/17	16 00		0.010K	2.940	0.130	0.294	0.430
73/09/16	11 38		0.010K	2.100	0.014	0.270	0.440
73/10/13	12 20		0.010K	1.350	0.024	0.029	0.135
73/11/18	13 20		0.010K	1.300	0.012	0.320	0.430
73/12/18	16 05		0.104	3.400	0.028	0.360	0.670
74/01/20	16 40		0.020	1.700	0.024	0.154	0.330
74/02/17	15 55		0.004	2.400	0.020	0.360	0.510

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/09

125281
27 59 30.0 081 42 30.0
UNNAMED STREAM
12105 7.5 ELOISE
0/LAKE ELOISE
BRDG BTWN LKS ELOISE AND LULU
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/18	10 46			4.200	0.030	0.600	1.650
73/04/15	17 27		0.210	2.700	0.040	1.470	2.100
73/05/16	13 10		0.010K	4.700	0.041	0.450	1.250
73/07/14	12 19		0.010K	4.600	0.032	0.630	0.990
73/08/17	14 55		0.016	2.200	0.066	0.660	1.000
73/09/16	10 38		1.000	6.600	0.110	0.640	1.000
73/10/13	11 35		0.014	1.900	0.020	0.294	0.480
73/11/18	12 14		1.400	2.300	0.020	1.560	1.950
73/12/16	15 42		1.120	3.500	0.028	1.760	1.880
74/01/20	15 39		0.730	2.200	0.016	1.500	1.880
74/02/17	15 26		0.380	3.200	0.020	1.930	2.500

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/08/25

1252C1
28 00 00.0 001 41 30.0
UNNAMED STREAM
12 7.5 ELOISE
T/LAKE ELOISE
STREAM CONNET LAKES ELOISE & SUMMIT
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/18	11 25		0.016	2.100	0.126	0.330	0.495
73/04/15	17 08		0.015	2.100	0.048	0.320	0.500
73/05/18	13 45		0.016	2.100	0.019	0.357	0.490
73/06/17	15 30		0.027	3.400	0.154	0.220	0.345
73/07/14	12 33		0.015	1.890	0.017	0.060	0.160
73/08/17	15 30		0.010K	1.890	0.020	0.140	0.290
73/09/16	11 12		0.066	1.800	0.035	0.055	0.180
73/10/13	12 05		0.016	1.760	0.021	0.067	0.200
73/11/18	13 03		0.500	1.350	0.022	0.300	0.450
73/12/16	15 55		0.152	2.300	0.036	0.192	0.360
74/01/20	16 20		0.016	1.600	0.016	0.280	0.420
74/02/17	15 43		0.052	1.850	0.015	0.135	0.270

K VALUE KNOWN TO BE
LESS THAN INDICATED